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ABSTRACT

A description is given of the history and current status of graduate level engineering courses and degrees at Ohio locations not readily accessible to existing private or public institutions. Recent demands for additional off-campus programs are due in part to the need of established engineers to study new areas at the advanced level. Ohio locations that offer branch campus or industrial site engineering programs are identified, and descriptions are given of various teaching methods used in these programs.

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NEEDS AND TRENDS OF OFF-CAMPUS

GRADUATE PROGRAMS IN OHIO

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NEEDS AND TRENDS OF OFF-CAMPUS GRADUATE PROGRAMS IN OHIO

The demand and need for off-campus graduate engineering courses and/or programs has gone through a cycle since the late 1950's and early 1960's. During this period, the State System in Ohio was not as large as it now is and there were not as many branches as there are now. Therefore, there was a backlog of persons desiring graduate level courses and degrees in locations not readily accessible to existing private or public institutions. This was true in Ohio as well as in some areas just adjacent to Ohio, such as Sharon, Pennsylvania, and Parkersburg, West Virginia. Furthermore, there were two large groups of the Federal Government that desired off-campus graduate work.

During this period, for example, Youngstown State University (then called YOUNGSTOWN University - it did not become a State University until 1967) taught graduate engineering courses in Sharon, Pennsylvania. The University of Pittsburgh ran a graduate program in Lima, Ohio, under a contract agreement with Westinghouse Electric Company. Ohio University taught graduate courses under contract in Charleston, West Virginia and also taught courses for engineers in Parkersburg, West Virginia. Of these programs, only the courses for the Parkersburg, West Virginia, area still remain.

In 1946 Ohio State University began a graduate program at the Wright Patterson Air Force Base for Military and Civil Service employees of the Base. Five areas of engineering were taught, all at the graduate level. This program is still in operation today, although it has now been opened to the greater Dayton community. Regular Ohio State University faculty

have been utilized and the courses are the same as those on the Main Campus. Faculty travel back and forth in a University limousine, taking approximately one and a half hours to make the trip one-way. Courses generally meet once a week. This program has granted approximately 500 M.S. degrees at Wright-Patterson Air Force Base; another 143 M.S. degrees at Ohio State University to students who began at WPAFB and later finished their thesis or other work on campus; and 154 Ph.D.'s have been awarded at O.S.U. to students who began master's work at Wright-Patterson.

In the 1960's, the University of Toledo (a municipal university prior to 1967 when it became a State University) began to offer classes under contract at the NASA Plumbrook Facility near Sandusky, Ohio. This facility was part of the NASA Lewis Research Center facility located adjacent to the Cleveland Hopkins Airport with about a one-hour drive between the two locations. At that time there were no part-time graduate engineering programs available in the Cleveland Area, since Case Institute of Technology (now Case-Western Reserve University) offered none and Cleveland State University had not yet been established. Fenn College was strictly an undergraduate school and did not have the resources to offer graduate work. Therefore, students from the NASA Lewis facility began to travel to the Plumbrook facility to take graduate courses.

It was not long before the Cleveland facility, which had many more technical personnel than the Plumbrook facility, made an agreement with the University of Toledo to teach courses at the NASA Lewis Research Center; this was accomplished and is still operating today. The University of Toledo teaches four graduate courses a quarter at the NASA Lewis facility, arranged so that each class meets once a week; courses are coupled so that students in a specific program can generally schedule two classes a

quarter, either on Monday and Wednesday or on Tuesday and Thursday. Each of the four faculty involved travel from Toledo to Cleveland once a week to meet the class and be available for student interaction. About 20 percent of the total graduate engineering credits of the University of Toledo are taught in this program. All courses are the same as those offered on the Main Campus. All students are given released time to attend these classes. Those students who were/are qualified to continue to the Ph.D. degree then obtain a leave from NASA and attend the University of Toledo to complete the requirements on campus. The Ohio State University and the University of Toledo programs described are the largest and longest continuous off-campus graduate engineering programs in the State of Ohio.

Other examples of off-campus graduate engineering work in the past are: University of Dayton at Wright-Patterson Air Force Base and at Findlay, Ohio; Ohio State University at Cambridge, Ohio, taught courses at RCA open to all residents; Ohio University taught courses at Chillicothe, Ohio; and the University of Cincinnati has taught (and still does) teach some graduate engineering courses through the Aerospace Department at the General Electric Company in Cincinnati, Ohio.

As the need grew for more graduate course work availability for employed engineers, the State System was expanded and a number of universities changed their practice of offering courses to accommodate a large number of part-time students. Wright State University in Dayton, Ohio, was established as a completely new school in 1964 now offering a limited amount of graduate work in engineering. Cleveland State University was established in 1965 with the former Fenn College as the nucleus and began offering graduate work in engineering in 1967. Also, during this same time period the University of Akron (1967), University of Toledo (1967) and

Youngstown State University (1967) became State Universities, although they had previously offered graduate work. Furthermore, branch campuses of some of the universities offering graduate work were opened in the major industrial centers where no State University existed.

Reference to the map will indicate that the State System has now expanded to cover all the major industrial areas with a main campus or branch campus. Also, because of the demand for off-campus work, almost all the universities have begun evening programs operating between the hours of 4:00 p.m. to 10:00 p.m. to accommodate the part-time student. These evening courses, offered at a centralized location, makes course work readily available to a large body of students and, in general, is more economical and less costly for the student (or employer if the company pays the tuition). Once the backlog of specialities needed for certain groups within certain industries was satisfied, the need to teach courses at remote locations lessened, since there were no longer the large numbers of students to populate the courses necessary for degree purposes. Furthermore, the State Universities were not encouraged, and in some instances not permitted, to teach graduate courses away from the main campus unless they were on a contract basis. Since the State Schools are subsidized by the State for the students taught, the courses must be available to all students and must be eligible for degree credits at the home campus. If they are too specialized or if the student body is closed to a specific group, then these courses must be taught under contract so that the full cost is recovered from the group receiving the benefits since no subsidy is provided by the State.

All graduate credit courses taught away from the main campus must be acceptable toward a degree; must have faculty qualified by the main campus criteria; and, must have facilities such as laboratories, library, instruc-

tion media, et cetera, needed to support the course. While these conditions are satisfied for some of the core courses generally associated with graduate programs, they may often not be satisfied for advanced courses even at the master's level and those must therefore be conducted at the main campus.

During the late 1960's and early 1970's the need and demand for off-campus graduate courses or programs was not as apparent as during the early 1960's because of the previously mentioned changes. However, within the past two years some new needs have surfaced, and new methods of servicing these needs have been developed. For one thing, there has not been the number of new employees brought into the scientific fields as there were in the previous decade thus reducing the numbers of new students entering into part-time programs. This, obviously, placed too large a burden on many companies to allow them to have graduate courses taught for only their few employees, since the total cost must be absorbed by the company for a relatively few students.

Case Western Reserve University began enthusiastically pursuing off-campus graduate engineering instruction in the Cleveland Area using different techniques. Among the approaches taken by CWRU is the use of one-way television with two-way audio along with the use of video cassettes. In this way the student at industrial, hospital, etc. settings may take part of a day to attend the course at his own location along with the class at the home campus. In some instances, video cassettes are sent to student's employers to allow them to make up courses they could not attend at the hour it was offered, or to make up classes in which the instructor may have been ill, or for any number of other reasons.

The quality of instruction is obviously the same, since the same on-campus course is utilized at the remote location. Additionally, in some courses the content and presentation is expanded through the use of close up cameras, slide projectors and special visual aids. In addition, the CWRU faculty involved with these courses periodically visit the off-campus location for discussion sessions. The faculty also have office hours during which time the students can talk to them and thus enhance the learning experience. To date, Case-Western Reserve University has offered over 65 different graduate engineering courses via this medium.

Once the initial cost to the employer of establishing the television-audio hook-up with CWRU has been overcome, the main cost is an operating cost including tuition, which thus provides the student with a very convenient means of learning while earning graduate credits. The momentum for this effort by CWRU has been growing rapidly. The system also benefits the main campus students by permitting the institution to offer some specialty courses to their full-time students that may not be offered because the demand on the main campus alone is too small, but when coupled with the demand at remote locations is then cost effective and all students benefit.

This paper so far leads us from the past through the present concerning the need and demand for off-campus graduate work in engineering. Almost all of the situations described thus far have included graduate credit courses with only a few non-credit continuing education courses. There is a movement underway within the State of Ohio to require all engineers to take a set number of hours of learning experiences within a given time limit to maintain a license. (This has already been enacted for CPA's in the State and has also been recommended for other professional groups.) With this in

mind. employed engineers are presently seeking graduate level course work, even though they are not specifically interested in obtaining a degree higher than the one presently held.

Another issue to be addressed by the universities is the upgrading and retraining of employed engineers. Since there has been less turnover in the last few years, and since many companies have had to move into new areas with a large engineering staff already employed, it is necessary for many of these engineers to study new areas at the advanced level. This also has just recently increased the demand for off-campus activity.

The Ohio Board of Regents has been made aware of such demands not only in engineering but also in business, education, medicine, law, et cetera, and the Advisory Committee on Graduate Studies to the Regents has worked with the Chancellor's Office to set up standards and procedures for the offering of off-campus work for subsidy purposes. These will now allow the State Universities more freedom in offering classes off-campus at the graduate level of instruction. All of the engineering schools are working with their own staffs and local engineering groups to provide what service they can.

In conclusion, I would again say that the need and demand for off-campus graduate education in engineering has gone through a cycle from high demand to lowered demand, and now on the increase again. I believe that the Universities of Ohio, both private and public, are aware of these needs and demands and are prepared to meet them as the demands increase. All universities have been, and will continue to be, concerned with the quality of off-campus work and will continue to demand the same quality in this area as they do for on-campus work. I think there is an exciting future for all of us in meeting this challenge.

UNIVERSITIES IN OHIO

<u>Location</u>	<u>University Offering Graduate Engineering Work</u>
Akron	University of Akron
Athens	Ohio University
Cincinnati	University of Cincinnati
Cleveland	Case Western Reserve University Cleveland State University
Columbus	Ohio State University
Dayton	University of Dayton Wright State University
Toledo	University of Toledo
Youngstown	Youngstown State University



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Cities in which State Universities offering graduate work in engineering are located.

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Major industrial centers in which there are Universities offering graduate work in engineering.

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Cities in which there are Branch Campuses of Universities offering graduate work in engineering.

• Other cities with considerable engineering and technical demands for education beyond the baccalaureate.